Guinea Pig Genetics Virtual Lab Teacher Support

Purpose Students will use this virtual lab to investigate how the potential parents of a particular offspring can sometimes be identified by looking at the characteristics of parents and their offspring. Students will examine the genotypes of potential parents to help students identify the possible genotypes of their guinea pig. They will use patterns of inheritance to determine the possible genotypes of their guinea pig by analyzing crosses of parents with known genotypes.

Class Time 30 minutes

Standard HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Record Data and Observations

1. *Answers will vary.* Student answers must describe each of the three traits (black fur or brown fur, rough coat or smooth coat, dark eyes or pink eyes) exhibited by the guinea pig that they selected.

Part 2

2. *Answers will vary.* Depending on which pair of parents the student selected, the possible offspring are shown in the table.

When these parents are chosen:	Here are the possible offspring:
If a *BbRRdd* male and a *BbRRdd* female	Black fur, rough coat, pink-eyed Brown fur, rough coat, pink-eyed
If a *BbRRdd* male and a *bbrrdd* female	Black fur, rough coat, pink-eyed Brown fur, rough coat, pink-eyed
If a *BbRRdd* male and a *BBRRDD* female	Black fur, rough coat, dark-eyed
If a *bbrrdd* male and a *BbRRdd* female	Black fur, rough coat, pink-eyed Brown fur, rough coat, pink-eyed
If a *bbrrdd* male and a *bbrrdd* female	Brown fur, smooth coat, pink-eyed
If a *bbrrdd* male and a *BBRRDD* female	Black fur, rough coat, dark-eyed
If a *BbRrDd* male and a *BbRRdd* female	Black fur, rough coat, dark-eyed Black fur, rough coat, pink-eyed Brown fur, rough coat, dark-eyed Brown fur, rough coat, pink-eyed
If a *BbRrDd* male and a *bbrrdd* female	Brown fur, smooth coat, pink-eyed Brown fur, smooth coat, dark-eyed Black fur, rough coat, dark-eyed Black fur, rough coat, pink-eyed Brown fur, rough coat, dark-eyed Brown fur, rough coat, pink-eyed Black fur, smooth coat, dark-eyed Black fur, smooth coat, pink-eyed
If a *BbRrDd* male and a *BBRRDD* female	Black fur, rough coat, dark-eyed

3. *Sample answer:* Brown fur color, smooth coat, and pink eyes appear to be recessive traits. When a guinea pig with one of these recessive traits is bred to a guinea pig that is homozygous dominant for that trait, the recessive trait does not appear among the offspring. If the guinea pig with the recessive trait is bred to a guinea pig that is heterozygous for that trait, the recessive trait will appear in approximately one-half of the offspring.
4. *Answers will vary. Sample answer:* My guinea pig is brown with a rough coat and dark eyes. I know that its genotype for color must be *bb.* It must also have at least one allele for a rough coat (*R_*) and at least one allele for dark eyes (*D_*).

5. *Answers will vary.* Student data will depend on the guinea pig they chose. *Sample table for a brown guinea pig with rough coat and dark eyes:*

Genotype of Male Guinea Pig Parent	Genotype of Female Guinea Pig Parent	Phenotypes of Possible Offspring	Possible Genotype(s) of Your Guinea Pig
bbrrdd	*bbrrdd*	Brown, smooth coat, pink-eyed	Not possible
BbRrDd	*BbRRdd*	Black, rough coat, pink-eyed Black, rough coat, dark-eyed Brown, rough coat, pink-eyed Brown, rough coat, dark-eyed	*bbRrDd*
BbRRdd	*bbrrdd*	Black, rough coat, pink-eyed Brown, rough coat, pink-eyed	Not possible

Analyze and Conclude

6. *Answers will vary. Sample answer:* Because my guinea pig is black and has a rough coat, I knew that at least one parent guinea pig must be black and have a rough coat. I chose guinea pig parents that were black with rough coats; I also looked for guinea pig parents with pink eyes since my guinea pig is pink-eyed. If a possible parent was dark-eyed, I had to check its offspring to make sure that at least some of them had pink eyes. Because pink eyes are recessive to dark eyes, I knew that either parent could be pink-eyed or dark-eyed.
7. Your classmate's guinea pig must be brown with smooth fur and pink eyes. Because these three traits are recessive, the genotype of your classmate's guinea pig must be *bbrrdd.*